5/21 Algebra - Downing 6.4B Compound Interest

Bellwork:

Evaluate: (Use calculator) $\sqrt[3]{-32} = -3.17$ $\sqrt[4]{20} = \pm 2.11$

Write as a rational exponent:

$(\sqrt[3]{25})^4 = 25^{4/3}$ $\sqrt[5]{(30)^2} = 30^{2/5}$

Identify Growth/Decay and tell what percentage.

$y = 20(1.07)^t$

↑

Same as $(1+.07)$

7% Growth

$y = 50(.91)^t$

↑

Same as $(1-.09)$

9% Decay

Write the function from the table below:

X	0	1	2	3
Y	2	6	18	54

$y = 2(3)^x$

Compound Interest – the interest earned on the principal and on previously earned interest. The balance, y, of an account earning compound interest is:

$$y = P\left(1 + \frac{r}{n}\right)^{nt}$$

P = principal (starting amount)
r = annual interest rate
t = time (in years)
n = number of times compounded per year

↓ ↓

annually = 1
semi-annually = 2
quarterly = 4
monthly = 12
bi-monthly = 24
weekly = 52
daily = 365

P = 12,000
r = .071
n = 12

1) You invest $12,000 at 7.1% APR compounded monthly. How much is your initial investment worth after 10 years?

$$y = 12000\left(1 + \frac{.071}{12}\right)^{12(10)}$$

$$y = 12{,}000\left(1 + \frac{.071}{12}\right)^{120}$$

$y = \$24{,}356.88$

P = 12000
r = .071
n = 1

2) You invest $12,000 at 7.1% APR compounded yearly. How much is your investment worth after 10 years?

$$y = 12000\left(1 + \frac{.071}{1}\right)^{1(10)}$$

$y = \$23{,}827.36$

Write and solve a function for each situation.

1. $1550 invested at 3.5% APR compounded weekly for 14 years

$$y = 1550\left(1 + \frac{.035}{52}\right)^{52(14)}$$

$$y = 1550\left(1 + \frac{.035}{52}\right)^{728} = \$2{,}529.67$$

2. $10,000 invested at 2.25% APR compounded monthly for 25 years

$$y = 10{,}000\left(1 + \frac{.0225}{12}\right)^{25(12)}$$

$$y = 10{,}000\left(1 + \frac{.0225}{12}\right)^{300} = \$17{,}541.31$$

3. $800 invested at 6.75% APR compounded daily for 10 years

$$y = 800\left(1 + \frac{.0675}{365}\right)^{365 \cdot 10}$$

$$y = 800\left(1 + \frac{.0675}{365}\right)^{3650} = \$1571.13$$

$P = 100$

You deposit $100 in a savings account that earns 6% annual interest compounded monthly. $r = .06$

$n = 12$

$y = P(1 + \frac{r}{n})^{nt}$

a) Write a function that represents the balance after t years.

$$y = 100\left(1 + \frac{.06}{12}\right)^{12t} \quad \text{or} \quad y = 100(1.005)^{12t}$$

b) How much money do you have after 10 years?

$$y = 100\left(1 + \frac{.06}{12}\right)^{12(10)}$$

$$y = 100(1 + .005)^{120}$$

$$y = 100(1.005)^{120}$$

$$y = \$181.94$$

$P = 500$

You deposit $500 in a savings account that earns 9% annual interest compounded quarterly.

$r = .09$

$n = 4$

a) Write a function that represents the balance after t years.

$$y = 500\left(1 + \frac{.09}{4}\right)^{4t}$$

$$y = 500(1.0225)^{4t}$$

b) How much money do you have after 18 years?

$$y = 500(1.0225)^{4(18)}$$

$$y = 500(1.0225)^{72}$$

$$y = \$2,481.58$$